AMENDMENTS TO THE SPECIFICATION

Please insert the following paragraphs after the first paragraph of page 9 of the publication of the parent PCT application, at line 6, just before the heading "BRIEF DESCRIPTION OF THE DRAWINGS":

According to another broad aspect, there is provided a method for reconstructing a surface from at least one arbitrary three-dimensional entity obtained from a target surface. The method comprises: obtaining a set of at least one three-dimensional entity and a position for the at least one entity in a common three-dimensional coordinate system, each entity being a set of three-dimensional points, each said point containing at least the three-dimensional coordinates of said point on the target surface, wherein the entity is one of an unorganized cloud, a three-dimensional curve and a range image; constructing a volumetric implicit representation of the target surface in the form of a vector field using said set, each vector in the vector field containing at least the distance to the target surface and the direction toward the target surface; and reconstructing the target surface from the information contained in the vector field.

According to another broad aspect, there is provided a method for refining an alignment of arbitrary three-dimensional entities obtained from a target surface. The method comprises:

(a) obtaining a set of at least two three-dimensional entities and a position for the at least two entities in a common three dimensional coordinate system, each entity being a set of three-dimensional points, each said point containing at least the three-dimensional coordinates of said point on the target surface, wherein each entity is one of an unorganized cloud, a three-dimensional curve and a range image;

(b) constructing a volumetric implicit representation of the target surface in the form of a vector field using a subset of at least one entity of said set, each vector

in the vector field containing at least the distance to the target surface and the direction toward the target surface;

(c) selecting at least one obtained entity;

(d) obtaining a subset of said points on each of the selected entities, points in these subsets being called control points;

(e) for each control point in each selected entity, computing a contribution to a cost function, the contribution being a function of at least the vector field and the coordinate of the control point;

(f) for each selected entity, computing a new position that optimizes its corresponding cost function; and

(g) placing each selected entity in the vector field at its newly computed position and updating the vector field accordingly.

According to another broad aspect, there is provided a system for reconstructing a surface from at least one arbitrary three-dimensional entity obtained from a target surface comprising: a three-dimensional entity provider for obtaining a set of at least one three-dimensional entity and a position for the at least one entity in a common three-dimensional coordinate system, each entity being a set of three-dimensional points, each point containing at least the three-dimensional coordinates of said point on the target surface, wherein the entity is one of an unorganized cloud, a three-dimensional curve and a range image; an implicit representation constructor for constructing a volumetric implicit representation of the target surface in the form of a vector field using said set, each vector in the vector field containing at least the distance to the target surface and the direction toward the target surface; and a target surface reconstructor for reconstructing the target surface from the information contained in the vector field.

According to another broad aspect, there is provided a system for refining an alignment of arbitrary three-dimensional entities obtained from a target surface, comprising: a

three-dimensional entity provider for obtaining a set of at least two three-dimensional entities and a position for the at least two entities in a common three-dimensional coordinate system, each entity being a set of three-dimensional points, each point containing at least the three-dimensional coordinates of said point on the target surface, wherein each entity is one of an unorganized cloud, a three-dimensional curve and a range image; an implicit representation constructor for constructing a volumetric implicit representation of the target surface in the form of a vector field using said set, each vector in the vector field containing at least the distance to the target surface and the direction toward the target surface; and a control point selector for selecting at least one entity used in the vector field; a subset provider for obtaining a subset of points on each of the selected entities, points in these subsets being called control points; a cost function calculator for computing, for each control point in each selected entity, a contribution to a cost function, the contribution being a function of at least the vector field and the coordinate of the control point; a new position calculator for computing, for each selected entity, a new position that optimizes its corresponding cost function; wherein the implicit representation constructor places each selected entity in the vector field at its newly computed position and updates the vector field accordingly.